

CONSTRUCTION WORKFORCE 2000

Thesis
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BY

MARK E. VAN VLECK

A REPORT PRESENTED TO THE GRADUATE COMMITTEE
OF THE DEPARTMENT OF CIVIL ENGINEERING IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF ENGINEERING

UNIVERSITY OF FLORIDA

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CHAPTER 1 INTRODUCTION

This report explores the effect that demographics will have on the nation as a whole and the construction industry in particular. The report is divided into eight chapters.

In Chapter 2, the effect demographics will have on society and the workforce for the nation is discussed. The projections for population and workforce growth that can be expected are discussed first. Then, the age and composition of the workforce that can be expected are considered. Finally, some techniques that companies have adopted and will need to adopt to recruit the workforce of the future are presented.

In Chapter 3, projections for the construction industry are discussed. The construction activity that can be expected is presented first. The projections for the workforce that will be required to fill the needs created by growth and replacement of workers leaving the industry follows. Finally, the industry's leaders responses to these projections are presented.

In Chapter 4, the present condition of the workforce engaged in construction is explored. The nature of the work and the paths that workers follow to enter the trades are discussed initially. Followed by some factors that affect job

satisfaction among the workers. The composition of the construction workforce is addressed next. The current supply of skilled workers is also addressed in this chapter.

In Chapter 5, the image of the industry and its workers, through the eyes of young people, is addressed. The results of a study conducted for the Construction Industry Workforce Foundation are presented in this chapter.

In Chapter 6, the training that must meet the needs of industry in the 21st century and the training that is being supplied are identified.

In Chapter 7, a summary of conclusions that can be extrapolated from the previous chapters is presented.

In Chapter 8, a series of recommendations are presented.

CHAPTER 2 NATIONAL PROJECTIONS

2.1 Background

In 1987, the Department of Labor released its predictions for the work and workers that could be expected in the year 2000. The Hudson Institute developed this document, entitled "Workforce 2000," for the department.

Three scenarios with different economic growth were used to bracket the possible outcomes. The baseline scenario reflects a modest improvement in the rate of growth that the nation experienced in the last fifteen years. The "world deflation" scenario assumes there will be a worldwide glut of labor, food, minerals, and manufactured products, resulting in sluggish economic growth. The last, the "technology boom" scenario, projects a boom in the economy, similar to that experienced in the 1950's and the 1960's (21:iv).

2.2 Population Growth

In the 1990's, the population is expected to grow at the slowest rate in the United States' history. The population is projected to reach 275 million by the year 2000, with immigration representing the greatest uncertainty. The U.S Bureau of Census assumes that immigration during this period will be 450,000 individuals per year. If this rate is

achieved, immigrants will make up a little more than one-fourth of the population gain in the United States (21:77).

2.3 Workforce Growth

The labor force is expected to grow from 115 million to 141 million by the year 2000. The labor force will be increasing, but it will be increasing at the slowest rate since the 1930's (21:78).

2.4 Impacts of slow Growth

Slower population growth will lead to less demand for population-sensitive products, such as food, automobiles, housing units, household goods, and educational services. Productivity gains are expected to account for a much greater fraction of national growth than during the past two decades. During the past two decades, increases in population and workers helped to fuel the economy (21:78).

Economic growth will depend more directly on an increased demand for income-sensitive products such as restaurant meals, luxury goods, travel, tourism, and health care. To survive, companies will focus more on capturing a larger share of the disposable income, than on serving a greater share of households. As a result, sectors of the economy that provide services and luxury goods will grow faster than sectors that provide population-dependent goods (21:78).

Due to the slower growth of the workforce and the smaller reservoir of well-qualified workers, labor markets will become tighter. Recessions may still lead to high unemployment, and undereducated workers may still suffer difficulties in the labor market. However, fewer well-educated workers will be available than during the 1960's and 1970's, forcing employers to increase wages to obtain and keep these workers (21:78).

2.5 Aging of Population and Workforce

The aging of the baby boom generation (those born between 1946 and 1961) will cause the American population to become older, on average, throughout the balance of the century. The median age of the population will reach 36 by the year 2000. This is six years older than at any time in the history of the United States (21:79).

Most of this aging will be the result of increases in the number of middle-aged Americans. Between 1986 and 2000, the number of people between the ages of 35 and 47 will jump by 38 percent. The number of people between the ages 48 and 53 will leap by a staggering 67 percent. The total population will only grow by 15 percent (21:79).

The number of young people will decline both relatively and absolutely. The number of people between ages of 20 and 29 will shrink from 41 million in 1980 to 34 million in 2000. Their share of the population will drop from 18 to 13 percent (21:80).

The age of the labor force will closely track the population. It will rise from a median of 35 years of age in 1984 to about 39 years of age in 2000. All the gains will come in the middle years of work life. The number of workers at the two extreme ends of the continuum will decline (21:81).

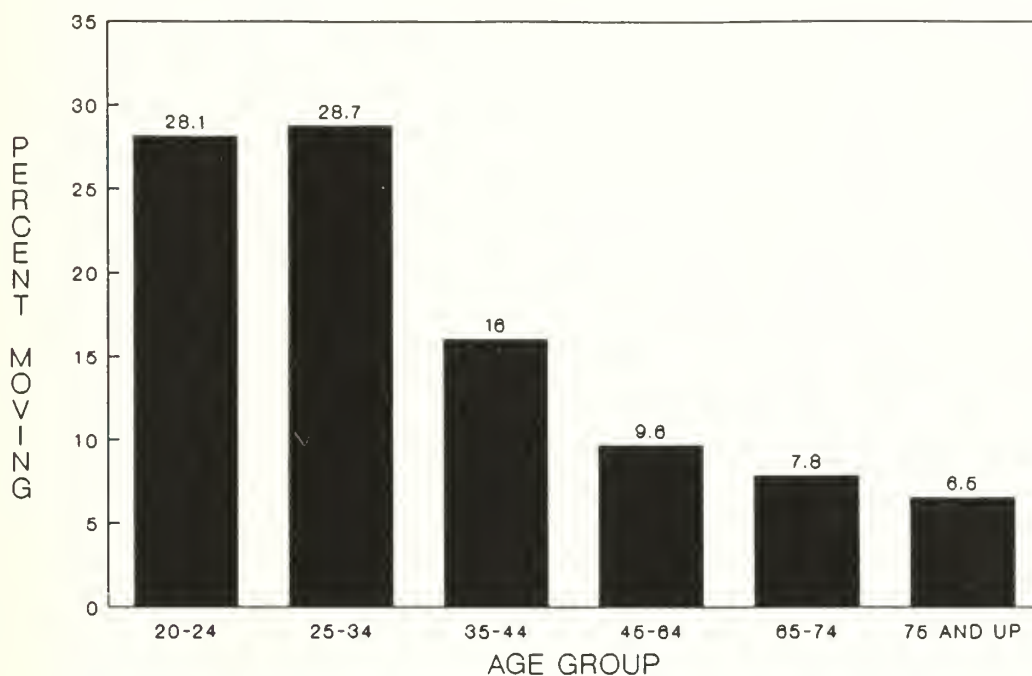
2.6 Impacts of Aging

A more experienced, stable, reliable, and generally healthy workforce should improve productivity. The initial task of educating and training the baby boom generation has been largely accomplished (21:83).

The economic dependency ratio (the proportion of the population not in the labor force compared to those in the labor force) is projected to continue dropping (21:83).

Labor markets for younger workers could tighten. Companies accustomed to hiring young workers at cheap wages may find that they must raise wages, reach farther down the labor queue, invest in labor-saving technology, or all three, to prosper (21:83).

YOUNG PEOPLE ARE MORE LIKELY TO MOVE (Inter-county Movers, 1976-1979)



Source: U.S. Bureau of the Census, Series P-23, Table 4-6

Figure 1

The aging workforce also may increase the rigidity of the economy. Older people are much less likely to move than younger ones (Figure 1).

Table 1

	<u>1985 Labor Force</u>	<u>Net New Workers 1985-2000</u>
Total	115,461,000	25,000,000
Native White Men	47%	15%
Native White Women	36%	42%
Native Non-white Men	5%	7%
Native Non-white Women	5%	13%
Immigrant Men	4%	13%
Immigrant Women	3%	9%

Source: Hudson Institute

2.7 Women in the Workforce

Over the next 15 years, women are expected to continue joining the workforce in large numbers. By the year 2000, approximately 47 percent of the workforce will be women. At that time, 61 percent of all women will be at work. Women will comprise three-fifths of the new entrants into the labor force between 1985 and 2000 (Table 1).

Women with children have accounted for most of the increase in the number of women participating in the work force. Of the 14.6 million married women who joined the labor force between 1960 and 1984, 8 million came from families with children (21:87).

2.8 Unemployment

Unemployment is projected to remain stubbornly high. The baseline scenario forecasts unemployment at just over 7 percent in the year 2000, despite the relatively slow growth of the labor force projected over the period. In the deflation scenario, unemployment climbs above 9 percent. Even in the boom scenario, unemployment is only reduced to 5.9 percent. High growth will draw more women and immigrants into the U.S. labor force. At the same time, many of the least-skilled will be unable to find jobs in the new high-productivity, high-technology economy (21:56).

2.9 Minorities in the Workforce

Minorities will be a larger share of the new entrants into the labor force. Non-whites will make up 29 percent of the new entrants into the labor force between now and the year 2000, twice their current share of the workforce. This share of a more slowly growing workforce might be expected to improve the opportunities for these workers. But, the concentration of blacks in declining central cities and slowly growing occupations make this optimistic outlook doubtful (21:xx).

2.10 Immigrants in the Workforce

Immigrants will represent the largest share of the increase in the population and workforce since the first world war. Even with the new immigration law, approximately 600,000 legal and illegal immigrants are projected to enter the United States annually throughout the balance of the century. Two-thirds or more of the immigrants of working age are likely to join the labor force. In the South and West where these workers are concentrated, they are likely to reshape local economies dramatically, promoting faster economic growth and labor surpluses (21:xx).

2.11 Recruitment

Corporations must recruit people who did not work in the 1980's. They must recruit the "undiscovered" sources of people, like the estimated 3.3 million people who have taken early retirement, those handicapped people who are now unemployed, and new immigrants (27:230).

The largest potential source is the estimated 14 million nonworking women caring for their families at home. More than 75 percent of working women are in prime childbearing years. Most of them either have children already or will have them at some point in their career lives (27:231). The only chance of coaxing millions of these women back into the work force is company-subsidized day care and flexible work arrangements (27:230).

Day-care is expected to become a common employee benefit (27:231). Day-care is not just a way to keep and attract good people. There is substantial cost savings as well. A 1988 study by Dominion Bankshares Corporation reported a 31 percent drop in absenteeism among parents who used day-care centers (27:231). Small businesses can cooperate with local schools to provide affordable, quality child care. Because they are held in school buildings, the programs save on utilities, rent, and transportation (27:231).

CHAPTER 3 PROJECTION OF INDUSTRY REQUIREMENTS

3.1 Construction Activity

Construction activity is expected to grow at a rate of 2.1% per year. This growth will vary for the different types of construction, however. As growing manufacturing industries invest in the most up-to-date factory technologies, the slump in industrial building construction is expected to reverse. The oversupply of office and commercial space is expected to be absorbed by the early 1990's, then construction of these facilities will experience an upturn. Residential construction will slowdown as the growth of the general population slows down (10:27).

3.2 Replacement Needs

New workers are needed in the construction industry both to replace experienced workers who are leaving the industry and to fill new job opportunities provided by growth in the industry. Most demand for new workers is the result of replacing former workers who leave the industry. These replaced workers may be older workers who retire, workers who died, workers who move to other industries, or workers who change occupations (20:10).

It is estimated that replacement needs will result in annual requirements for about 162,000 new workers to enter the construction industry during the 1990's, nearly six percent of all new entrants into the workforce (20:11). Of these, 117,000 are in the skilled crafts (20:11).

3.3 Growth Needs

The Bureau of Labor Statistics projected that 760,000 additional jobs will be added to the industry between 1988 and 2000. More than half the increase is in the construction trades--occupations that are projected to increase slightly in their share of the construction employment. The only other sizable employment gain in construction is for operators, fabricators, and laborers (159,000 jobs). However, the expected increase is not large enough to prevent this group from declining as a percentage of total employment (10:44). This translates into a need for 41,000 construction workers per year to meet industry growth or 35,000 skilled tradespeople and 6,000 unskilled construction workers (Table 2).

Table 2**Projected Annual New Entrants - 1990's
Selected Crafts**

	Replacement	Growth	Total
Construction Trades	109,000	33,000	142,000
Carpenters	32,300	10,800	43,100
Electricians	11,200	4,200	15,400
Bricklayers	4,900	2,000	6,900
Cement Finishers	7,900	1,400	8,600
Painters	11,400	3,400	14,800
Plumbers & Pipefitters	7,500	3,900	11,400
Equipment Operators	7,700	1,600	9,300
Laborers & Helpers	33,700	5,600	50,500
Skilled	117,000	35,000	152,000
Unskilled	45,000	6,000	51,000
Total	162,000	41,000	203,000

Source: Bureau of Labor Statistics and Construction
Labor Research Council

3.4 Industry Response

Recognizing that the national and industry projections could have a devastating effect on the construction workforce, a coalition of industry associations called the Construction Industry Workforce Foundation was formed in 1989 to create a greater awareness of the workforce crisis and seek viable solutions. This non-profit foundation brings together architects, engineers, general contractors, subcontractors, suppliers, construction users, union contractors and their unions as well as open shop contractors (Table 3).

Table 3

Charter Members
of the Construction Industry Workforce Foundation
American Consulting Engineers Council
American Fire Sprinkler Association, Inc.
American Institute of Architects
American Subcontractors Association
Associated Builders and Contractors
Associated General Contractors of America
Associated Specialty Contractors
Association of Drilled Shaft Contractors:
 International Association of Foundation Drilling
Contractor
The Business Roundtable
Independent Electrical Contractors
National Association of Minority Contractors
National Association of Women in Construction
National Electrical Contractors Association
National Roofing Contractors Association
National Utility Contractors Association
Painting and Decorating Contractors of America
Raymond LeChase, Inc.
Sheet Metal and Air Conditioning Contractor's National
Association
Sheet Metal Workers' International Association

Organizations Participating in
and Supporting the Foundation
Air Conditioning Contractors of America
American Road and Transportation Builders Association
Association of Wall and Ceiling Industries -
International
Building Owners and Managers Association
Construction Industry Institute
Construction Labor Research Council
Department of Labor: Bureau of Apprenticeship and
Training
Institute of the Ironworking Industry
Mechanical Contractors Association of America
National Council on Vocational Education
National Asphalt Pavement Association
National Association of Home Builders
National Erectors Association
National Fire Sprinklers Association
National Elevator Industry Inc.
National Glass Association
Specialized Carriers and Rigging Association
Tile Contractors Association of America
Source: Construction Industry Workforce Foundation

The Construction Industry Workforce Foundation has made a commitment to the following goals (20:2):

- 1) Create an awareness of the career opportunities in the construction industry.
- 2) Improve the industry's image with the public.
- 3) Increase the industry's market share of the labor force.
- 4) Organize a coordinated approach to workforce recruitment.
- 5) Produce a full range of materials to be used in recruitment.
- 6) Develop and implement industry-accepted training criteria.
- 7) Identify and eliminate the impediments to industry productivity.

To attract female workers, an Alabama based contractor opened a day-care center designed specifically for the needs of construction workers. The center is set up in a series of construction trailers that can be moved to a new site when the job is finished. Normal hours are 6:00 a.m. to 6:30 p.m., Monday through Thursday. When the work schedule calls for a second shift, the center stays open overnight. The same is true for weekends. The center is licensed by the state. Besides attracting female workers, the child care center has attracted single fathers and dual-income families (3:22).

CHAPTER 4

INDUSTRY IMAGE

4.1 Background

A senior vice president at a southern construction company thought it would be easy to recruit 100 bright students fresh from high school, shepherd them through one project after another for the next five years, and almost guarantee them a starting salary of about \$16,000. Did he get a surprise! There were just sixty-nine applicants, and only twenty-nine turned out to be qualified for the program (29:20).

In May 1990, on behalf of the Construction Industry Workforce Foundation, Barbara G. Rosenthal of Qualitative Research Services, conducted mini-focus groups among young people between the ages of 12 and 20 to explore their perceptions and attitudes toward the construction industry (32:19).

The groups were selected from four cities that met the following criteria (32:20):

1. The four quadrants of the United States must be represented.
2. The locations must have a mix of urban, suburban, and rural areas.
3. The locations must have a mix of union and non-union workers in the area.

4. The different climates must be represented.

The remainder of this chapter summarizes her findings. The validity of these perceptions will be explored in the following chapters.

4.2 Construction Industry

The industry is perceived as making an important contribution to society by creating shelter, business, roads, and jobs for people. On the larger scale, the industry represents progress and the future. Achievement, pride, creativity, and the production of visible tangible results of hard work were all part of this positive image. In addition, youngsters attributed the construction industry with these benefits for workers: good entry-level wages, insurance, compensation, retirement, and the opportunity to work with people and to learn a useful skill (32:22).

4.3 Construction Workers

The term "construction worker," embodied as the unskilled manual laborer, has negative connotations for young people. To youngsters, "construction workers" are the ditch diggers they see calling obscenities to passersby, loafing on the job. Most commonly associated with dirt, sweat, and a gruff demeanor, the construction worker lacks prestige, class, and respectability. Some youngsters pointed out that even if a contractor were making the same amount of money as a doctor,

the former could never have the same social stature as the latter (32:22).

4.4 Career Paths

For non-college bound youngsters, working in the military or law enforcement represents a step toward respectability, while working in construction is merely a means to a paycheck. Construction jobs are considered better than those of the fast food industry (the lowliest of jobs) only because the wages are higher. The only recognition of a career path was that a worker could advance in income, independence, and power by becoming a private contractor. The youngsters assumed that supervisors work their way up through the ranks of the unskilled (32:22).

4.5 Safety

It appears that the negative image of the construction worker far exceeds the issue of safety as the greatest obstacle for youngsters to join the ranks of construction. While the danger of construction work was mentioned in nearly all the groups as a negative attribute, it appeared to be less a deterrent than a rationalization for not choosing a job they expressed little interest in. Young people entering the military, law enforcement, or the automotive industry recognize that these careers are as dangerous as construction. Some of the young people even felt that the danger in

construction was in large part due to workers' carelessness or negligence (32:22).

4.6 Working Conditions

Youngsters expressed low interest in construction because the work seems "boring," "repetitious," "routine," "tedious," "tiring," and "stressful." They also felt negative about the long hours that they think construction requires, forcing the worker to be a "workaholic," taking time away from one's children, friends, or leisure activities (32:22).

That construction is "hard work" has both positive and negative connotations. The advantage is that hard work benefits the worker by building muscles, strength, and one's physique. The disadvantage is that hard work induces irritability and tension, making the worker grumpy and gruff on the job and at home (32:22).

4.7 Job Stability

Youngsters believe that construction work is unstable because of the weather. Work slows down or stops during extreme weather conditions, and workers get laid off. So construction workers, "treated like robots," become expendable. The idea of working outdoors during extreme weather conditions is very unappealing. Yet, some young people felt that being confined in an office was also unappealing (32:23).

4.8 Construction Professionals

Not all construction personnel are perceived negatively. Architects, designers, and engineers command respect because of their advanced education; education and training are strong values for youngsters. Other than those professionals mentioned, youngsters could not name any other construction personnel who need college training. There was very low awareness of jobs other than those most visible from the street. None mentioned construction managers, probably because that job is not easily noticed by the passerby. Also, there was a prevalent perception that anyone working in an office was really not a part of the construction industry (32:23).

4.9 Training

Although none of the young people voiced the distinction between skilled and unskilled labor, they clearly had a higher regard for trades requiring technical training beyond high school. The young people were aware that carpenters, plumbers, and electricians require additional training, but few of them knew what kind or how much training is involved, or which trades or skills required training. The young people consistently mentioned math and a high school diploma as requirements for a technical job. Yet, with regard to construction work, there was often the perception that you just "show up" for the job and start doing it. Then, the

supervisor, without giving any instructions, criticizes the novice for not performing successfully. They liked the concept of work-based training. It had great appeal to youngsters who felt "You can't learn everything in school" (32:23).

4.10 Minorities and Women in Construction

There is a belief that the construction industry excludes minorities and females. Blacks seemed less excluded than Hispanics. Females feel the most excluded. Some of the exclusion that young women feel comes from within: they lack the interest or desire to pursue a career in construction, and felt they did not have the ability to do the work (32:32).

Most of the young men asserted that young women can do anything they want. Yet, the white and Hispanic boys displayed some scorn toward females in construction. Both boys and girls said they were surprised if they saw a woman construction worker who looked attractive. Women workers were assigned similar attributes as their male counterparts: tough and mean. While some of the young people reported seeing female carpenters and electricians, others thought females in construction perform the lowliest jobs: holding "stop" and "slow" signs in traffic around a construction site. Sometimes, there was the perception that males do more important work (32:23).

CHAPTER 5 THE CONSTRUCTION WORKFORCE

5.1 The Construction Worker

All construction projects are of limited duration. When a job is completed, the field crews move on to another project or are laid off until more work becomes available. The average construction worker lacks a fixed relationship with any one contractor, and the tenure of employment with any given employer is normally indefinite and temporal. The workers are tightly bound to their occupation and are loosely associated with any given construction company. They may work for several different employers over time and are known more as carpenters or cement masons than as employees of any particular firm. These generalities are much less true for workers in the specialty trades, such as electricians and plumbers, than they are for carpenters, iron workers and others in the basic trades. Still, they typify employment in the construction industry (11:408).

The construction worker is in the atypical position of being a skilled artisan with no permanent place of employment because the projects of a typical construction company are relatively short-term, variable as to location, and demand different combinations of trade skills. All contractors experience fluctuating requirements for labor as new jobs are started and existing ones are completed. To remain fiscally

sound, contractors must draw their workforce from a local pool of workers as they need them (11:408).

5.2 Entry into the Trades

Personal relationships with friends and relatives play a key role for entry into the construction trades (Table 4).

Table 4

Method of Entry to Workers' Building Trade in Unions

	<u>Percent</u>
Taught by friend	19.6
Taught by relative	32.2
Self-taught	11.0
Union apprenticeship	37.3

Source: Marc L. Silver in Under Construction: Work and Alienation in the Building Trades

There is little incentive for a contractor to take on a worker with unknown aptitude for a particular trade given the unstable employment relationships. The same contractor, however, is likely to be more willing to help a personal relative get started in the trade, or to accommodate a trusted tradesperson trying to break in a friend or relative (33:113).

Many tradespeople get their first exposure to construction work in their early teens as part-time helpers, serving what amounts to a preapprenticeship. This experience helps them later, when they are going through formal apprentice training (33:113).

5.3 Mobility

The geographical mobility of construction workers is variable with the craft and the individual circumstances of employment. Crews on large industrial construction projects and on highways, pipelines, bridges, transmission lines, tunnels, and other engineering construction are highly mobile out of necessity. Millwrights, boilermakers, pipe fitters, pile drivers, and structural ironworkers often follow their specialties over wide geographical areas, moving from project to project. Building construction tradespeople are more apt to find continuous or relatively continuous employment within a given locality (11:408).

Several considerations such as home ownership, family ties, schools, pensions, and other factors make many construction workers reluctant to move their places of residence. This among other reasons, leads to a certain amount of movement into and out of the construction industry itself. Many tradespeople find jobs elsewhere in the economy when local job opportunities in construction for their particular craft skills are limited (11:408).

A recent study by the Construction Labor Research Council found that many construction workers leave the industry when they reach their mid-30's (25:64). Because the industry suffers from a high number of work-related fatalities, declining productivity and high attrition rate,

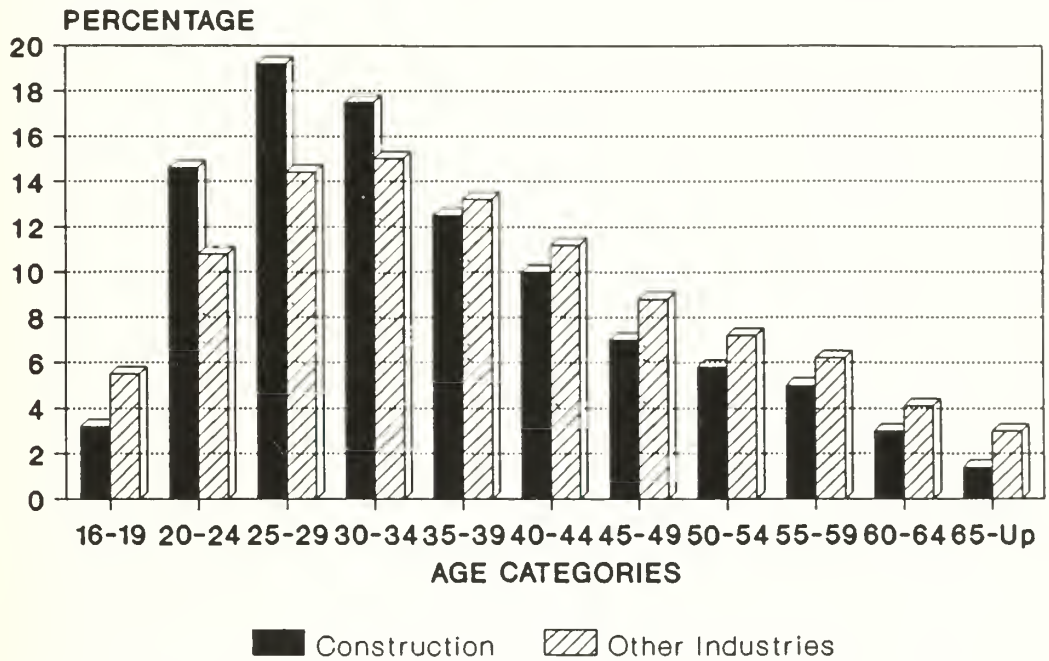
most construction workers change careers after 10 to 15 years (31:11).

The Construction Labor Research Council also found that unskilled workers feel little loyalty to the industry and mostly move on to jobs in other fields. They cited dirt, seasonality and the rugged physical labor that construction demands as their reasons for moving on. Experienced trade workers leave and use their skills in other industries for many of the same reasons. The study identified the lures of a fixed worksite, decent working conditions, stable jobs and increasingly competitive wages and benefits as reasons for their departure. The retention problem means that a higher number of young workers must be brought into the industry to net enough workers over time (25:64).

5.4 Age

The industry is more reliant upon young workers than other industries. In the construction industry, about twenty-five percent of all persons employed are under thirty years of age, compared to twenty-one percent for all industries. Persons fifty-five and over comprise eleven percent of construction employment, compared to 14 percent for all industries (Figure 2).

Age Distribution Construction Trades Vs All Males



Source: Construction Labor Research Council

Figure 2

Table 5
UNEMPLOYMENT RATES BY INDUSTRY
(1989 AND 1990)

<u>INDUSTRY</u>	<u>1989</u>	<u>1990</u>
Nonagricultural	5.3	5.7
Mining	5.8	4.8
Construction	10.0	11.1
Manufacturing	5.1	5.8
Transportation and Public utilities	3.9	3.8
Wholesale and Retail trade	6.0	6.4
Finance and service industries	4.4	4.5
Government workers	2.7	2.6
Agricultural	9.6	9.7

Source: Monthly Labor Review, February 1991

5.4 Job Stability

Job insecurity is a major source of job dissatisfaction among construction workers (1:111). Unemployment in construction is higher than any other industry in the United States. In December 1990, the unemployment rate for the nation was approximately 6 percent, while for construction it was 11 percent, almost double (Table 5).

Table 6

UNEMPLOYMENT RATES

<u>Occupation</u>	<u>Dec.</u> <u>1989</u>	<u>Dec.</u> <u>1990</u>
Total	5.1	5.9
Construction Trades	8.4	10.8
Construction Laborers	15.8	26.0

Source: Employment and Earnings, Bureau of Labor Statistics, January 1991

Within the industry, laborers are twice as likely to be unemployed as tradespeople (Table 6). Because of their relatively low skill, they are considered to be readily replaceable. But, when contractors find good tradespeople, they are very protective of them. Some companies put them on salary and will not let them go (6:72).

Table 7**HOURLY WAGES BY INDUSTRY**

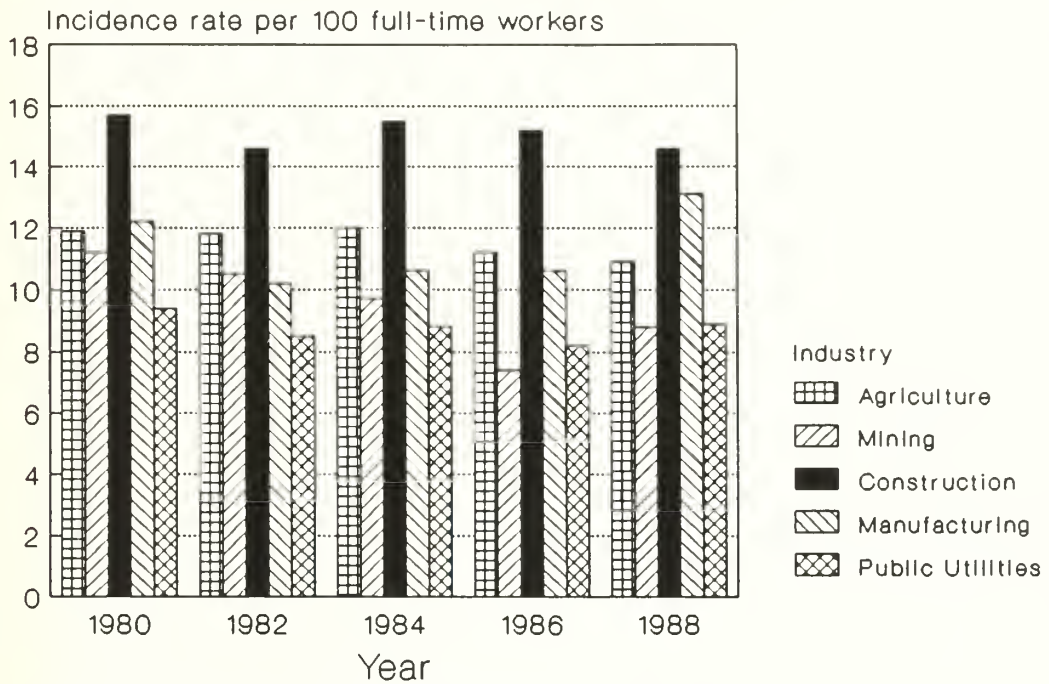
<u>Industry</u>	<u>1980</u>	<u>1990</u>
Private Sector	6.66	10.03
Mining	9.17	13.65
Construction	9.94	13.73
Manufacturing	7.27	10.84
Transportation & Public Utilities	8.87	12.95
Wholesale Trade	6.96	10.80
Retail Trade	4.88	6.78
Finance, Insurance, & Real Estate	5.79	9.99
Services	5.85	9.86

Source: Monthly Labor Review, March 1991

5.5 Wages

The hourly wages of the construction worker partially offset the high rate of unemployment in the industry. Construction workers have consistently been paid the highest hourly wages (Table 7). However, hourly earnings do not give an accurate picture of a construction workers affluence. The average full-time construction worker only works about 1,500 hours at his/her trade per year. Since construction workers are only employed for a given job or project, they have frequent periods of unemployment (1:110).

Occupational Injury and Illness Rate (total cases)



Source: Department of Labor, Monthly Labor Review

Figure 3

5.6 Safety

Construction is dangerous work and the industry's injury rates are consistently the highest and resist improvement (Figure 3). Construction's lost workdays are twice the rate of all industries combined--144.5 lost workdays per 100 workers (23:25). The number of construction workers that die each year varies by organizations that offer estimates. For example, the National Safety Council says that 2,400 persons died in 1985, while the National Institute for Occupational Safety and Health says the figure was about 1,033, and OSHA claims it was 729 (23:25).

Table 8

Labor Force Composition (1990)

	Construction	All industries
Women	8.6%	45.4%
Black	6.5%	10.1%
Hispanic	8.5%	7.5%

Source: Bureau of Labor Statistics, Employment and Earnings, January 1991.

5.7 Women in Construction

In 1990, the construction industry employed 7.7 million workers, accounting for 6.5% of the total workforce (16:196). Women accounted for 45.4% of the total workforce, and 8.6% of the construction workforce (Table 8). Within the industry, only 1.6% of the women were employed in the crafts (Table 9). Only 8.5% of all women are employed in these occupations for all industries. This low number for all industries can be traced back to construction, however (Table 10).

Society continues to perceive women as protected, more delicate species incapable of doing "man's work." Because of this societal influence, many women continue to limit themselves to employment considered more traditional for women (2:392).

"Women are their own worst enemies (30:90)." Other women may resent women going into non-traditional occupations. Some express fears that these women will seduce their husbands at work or that they are taking work away from able-bodied men,

Table 9

Employment of Women by Occupation in 1990
(Percentage of total employment)

OCCUPATION	ALL INDUSTRIES	CONSTRUCTION
All occupations	45.4%	8.6%
Executive, administrative, and managerial	40.0%	13.2%
Professional specialty	51.2%	8.3%
Technicians and related support	49.2%	12.7%
Sales	49.2%	18.4%
Administrative support, including clerical	79.8%	88.1%
Service	60.1%	26.5%
Precision production, craft and repair	8.5%	1.6%
Machine operators, assemblers, and inspectors	40.0%	3.6%
Transportation and material moving	9.0%	1.0%
Handlers, equipment cleaners, helpers and laborers	17.7%	2.2%

Source: Bureau of Labor Statistics, Employment and Earnings, January 1991.

and thus are increasing the unemployment rate. These complaints have been voiced by the wives of some police officers and firefighters. These women resented having their husbands be shift partners or sleeping companions with women as part of their duty assignments (30:94).

Table 10

**Employment in Construction by Occupation in 1990
(as a percentage of employment for all industries)**

OCCUPATION	
All occupations	6.5%
Executive, administrative, and managerial	7.0%
Professional specialty	0.8%
Technicians and related support	1.6%
Sales	0.5%
Administrative support, including clerical	2.3%
Service	0.2%
Precision production, craft and repair	32.3%
Machine operators, assemblers, and inspectors	1.4%
Transportation and material moving	10.8%
Handlers, equipment cleaners, helpers and laborers	17.7%

Source: Bureau of Labor Statistics, Employment and Earnings, January 1991.

So well entrenched is the male figure in the professional, managerial, and crafts aspect of the industry that employment patterns are hard to change (27:393). Many men in hiring positions continue to insist that all facets of the industry are "man's work" and that women are an unneeded sexual stimulation, are too emotional, and are not strong enough (2:393). These attitudes cannot be entirely correct, however, because Russia graduates more female engineers, architects, and physicians than men (2:393). Also,

women in Russia and China make up half of the employees at building sites (37:150).

The American attitude toward women is slowly changing. One construction executive says his mind was changed about women in construction when he saw 90-pound women expertly operating cranes and other heavy equipment in Vietnam (27:394). Another firm in North Carolina recruits and enrolls women for training as heavy equipment operators with excellent results (27:394).

Women today no longer work for pin money, or until they are married, or until a baby arrives, or for self-expression and satisfaction. They work today for the same reason men work: money (27:392).

Young women are beginning to realize that they can earn higher wages without investing four or more years in advanced education by seeking such previously male-dominated employment fields as telephone lineperson and installers (27:394).

The heavy work causes the most problems for women workers, but they feel better suited for other tasks. Sometimes technique, which can be learned, is more valuable than brute strength (30:90).

With male workers scrutinizing their every move, and a lack of sufficient role models, women are confronted with a social situation that encourages the self-imposed development and enactment of excessive work demands (30:90).

Table 11

Employment of Blacks by Occupation in 1990
(Percentage of total employment)

OCCUPATION	ALL INDUSTRIES	CONSTRUCTION
All occupations	6.4%	6.5%
Executive, administrative, and managerial	5.7%	2.9%
Professional specialty	6.7%	3.9%
Technicians and related support	9.1%	6.3%
Sales	6.4%	3.9%
Administrative support, including clerical	11.4%	3.7%
Service	17.3%	11.8%
Precision production, craft and repair	7.8%	6.0%
Machine operators, assemblers, and inspectors	14.4%	7.1%
Transportation and material moving	9.0%	8.4%
Handlers, equipment cleaners, helpers and laborers	15.7%	13.4%

Source: Bureau of Labor Statistics, Employment and Earnings, January 1991.

5.8 Minorities in Construction

In 1990, blacks accounted for 10.1% of the total workforce, and 6.5% of the construction workforce (Table 11). Hispanics accounted for 7.5% of the total workforce, and 8.5% of the construction workforce (16:196).

Table 12

**Employment by Occupation
in the Construction Industry
(percentage of total)**

<u>Occupation</u>	<u>Women</u>	<u>Black</u>	<u>Hispanic</u>
Supervisors	1.5	4.4	4.6
Brickmasons & stonemasons	0.2	14.4	10.7
Tile setters, hard & soft	2.0	4.9	14.3
Carpet installers	2.1	4.2	11.2
Carpenters	1.3	4.8	8.7
Drywall installers	1.0	5.1	15.5
Electricians	1.7	6.2	5.2
Electrical power installers & repairers	1.7	8.2	4.2
Painters	5.6	9.5	13.3
Plumbers, pipefitters, & steamfitters	0.9	6.6	6.5
Concrete & terrazzo finishers	0.6	23.1	23.7
Insulation workers	1.5	10.9	19.4
Roofers	0.3	8.5	13.6
Structural metal workers	0.2	3.7	8.0
Operating engineers	0.8	10.9	8.5
Excavating & loading machine operators	0.6	9.1	6.3
Grader, dozer, & scraper operators	1.4	6.4	8.6
Construction helpers	5.7	16.9	18.9
Construction laborers	3.2	13.2	16.3

Source: Bureau of Labor Statistics, Employment and Earnings, January 1991.

Within the industry, minorities are much better represented in some trades than others (Table 12). They have made a particularly strong showing in the occupations of concrete and terrazzo finishers.

Members of minority groups often have little or no tradition of work at the building trades and by that lack familiarity with the nature of the business and its institutions. There is often a reluctance to consider employment at the trades as a feasible method of earning a livelihood. Further, young persons have little opportunity, except in a few trades, to become acquainted with the rudiments of a craft from tradespeople in the area. To a large degree, these conditions are the heritage of past discrimination, but they also stem from the migration of many blacks from the agricultural South to the cities of the North and the West. Because few blacks come to the building industries on their own initiative or through the referral of their associates, it may be necessary to employ extensive recruitment efforts to attract them (26:161).

5.9 Recruitment

A problem faced by open-shop contractors is obtaining an adequate number of skilled workers. Of necessity, the open shop firm must recruit its workforce through more informal channels than does its unionized counterparts. Through hiring halls, the construction unions act as brokerage agents to provide unionized contractors with the needed labor. Non-union companies do not have such a centralized recruitment mechanism available to them (11:432).

Open-shop contractors now use a variety of procedures to help them obtain their field forces. Employee referral centers or registries have been established in many areas about the country that provide a central source of open-shop personnel. Usually operated by local chapters of the Associated General Contractors of America (AGC) or the Associated Builders and Contractors (ABC), these services provide contractors with the names and other information about registered individuals with specific construction skills. These centers maintain a file of names, skills, experience, and addresses of people who sign up for job placement. Advertisements in local newspapers, and other media advise the community that the referral service is available. Contractors obtain names from the center and make their own contacts, conduct their own interviews, and do their own hiring. Open-shop hiring halls are also being established in many large urban centers (11:432).

Besides the referral center and hiring halls, open-shop apprenticeship and other training programs produce substantial numbers of skilled tradesmen. All open-shop firms maintain a network of informal worker contacts, mostly through their project superintendents and crew supervisors. Many such firms cooperate with one another by lending and training workers among themselves as their individual needs dictate (11:433).

5.10 Supply

According to a 1989 survey of 826 Associated General Contractors' open shop members, nearly half the firms were experiencing work force shortages. The contractors said that carpenters and equipment operators are the most scarce. Keeping qualified craftspeople topped the list of the most important needs over the next decade (Table 13).

In June of 1990, Engineering News Record reported that the supply of skilled craftspeople was extremely tight in the Southeast, tight in the West, and getting tighter in the Gulf Coast region (18:68).

Some contractors in the Southeast claim productivity in the region is declining, especially on the nonunion side, because of shortages of skilled craftspeople (6:72).

Shortages of craft workers are affecting wages in some locations. On the East Coast, the shortage of workers is driving wages up according to Jeffery M. Robinson President of Personnel Administrative Services Incorporated (25:66).

Table 13

Open Shop Needs Over the Next Ten Years

NEED	% of Firms Reporting
Keeping good craft workers	64.2
Staying open shop	51.5
Safety	48.7
Productivity	46.8
Supervisory training	33.0
Craft training	32.6
Marketing	17.4
Government compliance	15.7
Good fringe benefits	13.6
Prevailing wage compliance	13.4
Equal Employment Opportunities	12.8
Recruitment	12.8
Labor relations assistance	8.8

Source: Associated General Contractors (28:19)

"How long can you buy more workers before the supply runs out is the big question," says Construction Labor Research Council Executive Director Robert M. Gasperow (25:66).

To get good workers contractors are paying higher wages. Contractors are worried because competition for crafts workers is not just between union and nonunion firms, but also with other industries. Firms are predicting that their costs for safety and recruiting will increase as they attempt to make the industry more attractive by stepping up those activities (6:72).

Contractors are also worried about missing contract opportunities because of craft shortages, a cost that they say is a lot harder to quantify than higher wages (6:72).

Contractors and projects that offer workers more training are having an easier time with staffing. Training is a big drawing card. Workers will come to projects where they know they can get some training (6:72).

CHAPTER 6 TRAINING

6.1 Background

In a recent report to Congress, the Office of Technology Assessment concluded, "Good training pays off--for the individual worker whose skills are upgraded, for the company seeking a competitive edge, and for the Nation--in overall productivity and competitiveness" (8:33). Formal training provides better-skilled and more productive workers. It also increases the capacity of the worker to obtain employment when the volume of construction declines (26:181).

A paving company in Utah demonstrated its concern about competitiveness through a self-produced training program. The result was a rise in productivity, approaching 50 percent for some jobs, and smaller workforce. The company found it could do more work with fewer people. Other benefits were improved communication and planning, which cut down on mistakes on the job (34:56).

In each craft, there is a wide range of work requiring a wide range of skills. Much work in all crafts demands a high degree of skill, training and experience. At the same time, however, much of the work in all crafts requires little skill or skill in a limited area, which can be easily and quickly learned (35:4).

In the homebuilding industry, if workers receive any formal training at all, they receive it: (1) outside the construction industry altogether; (2) in the union sector; (3) from individual residential employers. The number of residential workers who have received formal training from any of these sources appears small. Skills are usually acquired informally and haphazardly through experience on the job. The result is that few workers develop a broad range of skills at their craft, and many can function only under the careful supervision of a supervisor or the employer (19:78).

A 1989 survey of Associated General Contractors' open shop members indicates that many nonunion construction workers lack formal craft training. About 60% of surveyed firms said their workforce had received only on-the-job training and 72% said their construction supervisors lacked formal supervisory training(28:20).

Some employers, especially small employers, fear that if they invest in training, their investments will walk off to work for another employer. These employers find it cheaper to pirate the skilled workers they require from fellow employers (8:2).

It is difficult for contractors involved on the national level to justify training of union and nonunion personnel who may not stay with the company, since the benefit of such training will be realized by competitors. The real benefit accrues to the individual receiving the training, and, if it

is administered properly, the individual is grateful to those making it possible. The improvement in overall productivity resulting from knowledgeable craftspeople and the improvement in the image by which the public views the construction industry are two positive incentives for creating more training opportunities (14:339).

6.2 Apprenticeship in the United States

European settlers brought craft training in the building trades to America in the colonial days. At the time, the training reflected the traditional apprenticeship system. Young men were indentured to a craftsman or an organization of craftsmen. They learned on-the-job until they became proficient enough to attain the status of craftsmen or journeymen (35:2).

Not until the latter part of the 19th century were any apprenticeship systems begun that were at all comparable with those of today. The number of plants in which apprentices were trained was limited and the training was usually sketchy when measured by modern standards. Most skilled workers still came from abroad. Most of the workers acquired their skills in this country by watching and getting the advice of experienced workers, by sheer persistence, and by trial and error (35:3).

The first legislation in the United States to promote an organized system of apprenticeship was enacted in Wisconsin in

1911. The law placed apprenticeship under the jurisdiction of an industrial commission. This followed the enactment of state legislation requiring all apprentices to attend five hours of classroom instruction a week (15:14).

In the 1920's, national employer and labor organizations, educators, and government officials began a concerted effort to bring about a national, uniform apprenticeship system. In the forefront of this movement were representative groups of the construction industry (15:14).

The need for comprehensive training of apprentices became a vital necessity in the boom days following World War I. Immigration was curtailed after the war, so fewer skilled workers were entering from other countries. The combined effort of the various groups led in 1934 to the participation of the federal government in the national promotion of apprenticeship. The Federal Committee on Apprenticeship, composed of representatives of Government agencies, was appointed by the Secretary of Labor to serve as the national policy-recommending body on apprenticeship in the United States. It was to assume the responsibilities with respect to apprentices and their training under the industrial codes formulated by the National Recovery Administration (15:14).

In 1937, Congress passed the National Apprenticeship Law. This law, popularly known as the Fitzgerald Act, set the pattern for today's system of federal government assistance in apprenticeship programs. The Federal committee on

Apprenticeship was reorganized and enlarged to include equal representation of employers and labor, plus a representative of the U.S. Office of Education. The Apprentice-Training Service, renamed the Bureau of Apprenticeship and Training in 1956, was established as the national administrative agency in the Department of Labor to carry out the objectives of the law, guided by recommendations of the Federal Committee on Apprenticeship (15:16).

Since 1937, the Bureau of Apprenticeship and Training has worked closely with employer and labor groups, vocational schools, state apprenticeship agencies, and others concerned with apprenticeship programs in U.S. industry. It has field representatives in each of the 50 states. Its functions are advisory and promotional. It does not itself conduct training programs (15:16).

In recent years, the thrust of federal policy affecting apprenticeship and training has been more the result of court orders and attempts to conform with the requirements of other laws than the result of new apprenticeship legislation or amendments to the Fitzgerald Act. However, the impact of the Fitzgerald Act has been broadened by Labor Department regulations promulgated without any congressional instructions (35:3).

The labor standards, policies, and procedures about the registration, cancellation, and de-registration of apprenticeship programs are covered in Title 29 CFR Part 29.

The policies and procedures for promoting equality of opportunity in apprenticeship programs are covered in Title 29 CFR Part 30 (15:16).

Programs can be certified by the Bureau of Apprenticeship and Training or by a State Apprenticeship Council recognized by the Department of Labor and empowered to implement the Bureau of Apprenticeship and Training standards (15:18).

Programs registered by the Bureau of Apprenticeship and Training or State Apprenticeship Council must provide the following (17:8):

- 1) The starting age of an apprentice is not less than sixteen.
- 2) There is full and fair opportunity to apply for apprenticeship.
- 3) There is a schedule of work processes in which an apprentice is to receive training and on-the-job experience.
- 4) The program includes a minimum of 144 hours per year in organized instruction designed to provide apprentices with knowledge in technical subjects related to their trade.
- 5) There is a progressively increasing schedule of wages.
- 6) Proper supervision of on-the-job training with adequate facilities to train apprentices is insured.

- 7) The apprentice's progress, both in job performance and related instruction, is evaluated periodically and appropriate records are maintained.
- 8) There is employee-employer cooperation.
- 9) Successful completions are recognized.
- 10) There is no discrimination in any phase of selection, employment, or training.

Joint apprenticeship committees, composed of representatives of management and labor, work together to develop and administer local apprenticeship training programs. Besides local groups, national trade committees represent national organizations. With the help of the Bureau of Apprenticeship and Training, the national committees formulate policies on apprenticeship in the various trades and issues basic standards to be used by affiliated organizations.

Although apprenticeship training does exist, it is small, accounting for 0.16 percent of the workforce. The average U.S. apprentice is at least 23-years-old and has had previous employment or education. Because of its limited scope, apprenticeship training is not the major mode of initial training for high school graduates. Instead 57 percent of these graduates enroll in post secondary education, and a majority drop out, leaving employers the task of completing their training (9:34).

Training for craft occupations in construction is designed to produce journeymen who are able not only to

perform certain tasks under supervision but to supervise themselves to a large degree. The journeyworker is trained to perform much of the supervisory and planning functions that in other industries are the role of management. In addition, many journeyworkers become supervisors, or inspectors, and the training provided in many apprenticeship programs is designed to prepare workers for these functions (26:183).

6.3 Training in Union Programs

The building trades unions and contractors, through collective bargaining agreements, have created joint-apprenticeship committees, thus perpetuating the centuries-old apprenticeship system for training craftworkers. Labor and management share in the administration of the training in varying degrees, but union membership is always a prerequisite for an individual to enroll in the program. The training can last from three to five years, depending on the craft, and covers nearly all facets of a given trade. Pay generally starts at half the journeyworker rate and increases in predetermined intervals during apprenticeship, presumably reflecting increased skill and experience until journeyworker status is reached (35:5).

The extent to which journeyworkers learn their craft through apprenticeship programs varies among the individual trades (Table 14).

Table 14

**Journey Workers Receiving Training
Through Apprenticeship Programs**

<u>Occupation</u>	<u>Percent</u>
Electricians	73
Sheet metal workers	71
Plumbers and pipefitters	55
Brickmasons, stonemasons & tilers	45
Carpenters	31
Painters	28
Crane operators	18
Excavation, grading & road machinery operators	11

Source: The Business Roundtable, Construction Industry Cost Effectiveness Project Report D-2, May 1982.

The United Brotherhood of Carpenters and Joiners of America is investigating the use of interactive video disk technology that allows student to study at their own pace, look up terms, seek extra help and administer tests to themselves--all on television (24:17).

For all the concerns about skill shortfalls, localized resistance to expansion remains. A California carpenter said that at least one training program has resorted to placing apprentices with nonunion contractors because of resistance from union employers (24:17).

"Convincing employers to hire apprentices is still one of our biggest problems," said Lewis K Pugh, the carpenters' director of research. He recommended that locals consider

increasing permissible apprentice ratios and adding language to labor contracts that would force their use (24:17).

6.4 Training in Nonunion Programs

There exist several formal and informal programs for the training of skilled and semiskilled craftspeople. One of the most common programs is the designation of "helper" category, where the individual works with and receives training from journeyworkers. This informal program provides excellent on-the-job training. The deficiency in this program rests mainly in the lack of well balanced preparation for a trade and its heavy dependence on the skill of the journeyworkers and their ability to train. Finally, there is no certification for the newly trained individuals that readily identify their ability. Since anyone can claim having received such training, contractors are often reluctant to hire such an individual even when they become somewhat desperate for craftspeople (14:338).

Those contractors involved in the Merit Shop concept to provide intensive specialized training to create a craftsperson skilled only in those areas required by a particular project, called "Task Training," have often carried the training right to the job site itself. This effort represents formal training programs in that the trainee receives both classroom and skill training, with a certification of the obtained skill level. These programs not

only provide a flexible method of creating trained personnel in an area where skilled craftspeople are not otherwise available, but also create an opportunity for continued on-the-job training and ultimately the classification as journeyworker. This program also allows an individual to receive training in more than one of the traditional craft skills, which may provide for longer tenure with a contractor and a particular project (14:338).

Associated Builders and Contractors has complained that getting open shop apprenticeship programs approved is difficult, if not impossible, because many of the State Apprenticeship Councils are "heavily union-dominated" (5:13).

On May 16, 1989, the Department of Labor's Bureau of Apprenticeship and Training allowed the Associated Builders and Contractors (ABC) to drop a 3:1 journeymen-to-apprentice ratio from its standards. While ABC has argued that the ratio was just a pattern, State Apprenticeship Councils viewed it as a requirement. The change allows the ratio be set at the local level to fit conditions. It will make a big difference on projects covered by the Davis-Bacon prevailing wage law (5:13).

In December of 1990, the Bureau of Apprenticeship and training proposed the following changes to apprenticeship rules (4:11):

- 1) Program sponsors can complain directly to Bureau of Apprenticeship and Training officials when they are

having difficulties getting their programs approved by State Apprenticeship Councils.

- 2) Abolish the existing ratio requirement of apprentices to journeyworkers on non-Davis-Bacon work and would determine the number of apprentices by the sponsor's "capacity to train."
- 3) Drop the 144-hours of related instruction requirement and requiring only "a measurable component" of instruction.
- 4) Make training programs portable. This will allow employers sponsoring a program in one state to use another state's program for up to six months, even if the other program is not approved.
- 5) Wants sponsors to grant credit for previously-acquired experience or skills.
- 6) Increase the minimum term of registered programs from one year to two years, (4000 hours).

Each of these proposals was opposed by labor unions and State Apprenticeship Councils. Nonunion contractors hailed them as steps in the right direction.

6.5 Vocational Education

All fifty states have vocational education systems, which aim to help persons pick, prepare for, enter, and progress in an occupation. Organizational structure and training abilities vary among states and among institutions within

states. Local school boards generally have final control over the content of public educational offerings in their communities, although minimum requirements may be set by state boards of education. Public vocational education is normally financed by a combination of state and local taxes. States can often tap federal funds for distribution to local districts to help programs considered important to the nation (36:3).

Vocational education is usually aimed at three groups (36:4):

- 1) Secondary-school students in grades 11 and 12 are offered courses stressing basic knowledge, attitudes, skills, and habits required to get a job in a specific occupation.
- 2) Post secondary-school students, including high school graduates and non-graduates can pursue an organized program or curriculum. These programs are usually one or two years in length.
- 3) Adults can take short courses, not part of an organized, longer curriculum, either to prepare for entering an occupation or to upgrade skills in an occupation.

Vocational curriculum offerings are not standardized across state lines, and often, are not standardized from school to school within a state. Several departments of vocational education have established curriculum and instructional-materials for vocational programs. The benefits of such a system are that the materials are current and

relevant to the needs of the industry and that it encourages a degree of uniformity from school to school (36:4).

A lack of ongoing contacts and an understanding of the industry's and vocational education's capabilities and problems are major reasons for minimal use of vocational education systems in construction crafts training (16:8).

Thirteen-year-old students at Brixner Junior High School in Klamath Falls, Oregon are learning the construction craft. That school recently adopted the Associated General Contractors Construction Skills curriculum. The program includes a three to five-week introductory courses in construction safety, site layout, and one of the 12 basic crafts. The curriculum has been approved by the Oregon Department of Education (12:14).

6.6 Certification

The Construction Industry Workforce Foundation is discussing the idea that workers should be issued a continuously updated transcript identifying the specific skill modules of a competency-based training program as they are successfully proven. Such a transcript would make it possible to transfer applicable skills, with appropriate credit, across programs, crafts, and vocational education curriculum. Such a record is expected to encourage upgrading of skills and retraining (20:3).

After nine years of planning and development, the Associated General Contractors launched a craftworker certification program on June 17, 1989. Officials hope the certification will give employers a better handle on the quality of their workers' skills (13:13).

Working with the Oklahoma Department of Vocational and Technical Education's testing division, Associated General Contractors has devised a series of written competency tests that have been frequently revised and field-tested. Participants can choose from six test in carpentry (three each for residential and commercial work), one in bricklaying and one in stonelaying (13:13).

The certification will establish a minimum level of acceptance. Nonunion contractors, particularly, are at the mercy of the individual and his representation of his skills. It also makes workers "more employable" by providing them with another measure of their skills. Some contractors have offered raises to their test takers. The program is open to union and nonunion workers. The certification is not a substitute for the journeyworker's card. Associated General Contractors plans to do follow-up surveys to evaluate how well the tests actually measure on-site abilities (13:13).

6.7 European Training

In the United States, most training is focused on white collar workers, whereas Japan and Germany concentrate more on developing blue-collar workers' skills (7:4).

Millions of American Youth leave high school with little hope of entering well-paid jobs. In contrast, apprenticeship programs in Europe train their youths for skilled, well-paid trades (7:5). Other industrial nations, including Germany, Sweden and France are far ahead of the United States in apprenticeship training.

German workers receive two major types of training: apprenticeship and further training. About 65 percent of each class of middle school graduates enter apprenticeship training in one of 380 fields ranging from skilled manufacturing to office work. Over 3 years, these would-be-apprentices spend 4 days per week in on-the-job training and at least one day per week at a state-supported vocational school (8:33).

To respond to growing international competition, German firms and governments are stepping up the pace of further training. Traditionally, further training has taken the form of off-hours classes at state-supported schools, with employers and government paying tuition for workers who wish to be certified as master craftworkers and by that qualify for promotion to supervisory positions. Such training is now being supplemented with on-hours and off-hours courses in the use of new technology and other subjects (8:33).

In America, apprenticeship is a post secondary school system of training, but in Europe is a part of vocational schooling. In this country, apprenticeship has only tenuous connections with the public school system through related instruction. In Europe, apprenticeship is an integral part of the process of schooling. In fact, apprenticeship performs considerably different functions here than it does abroad and is really a very different system of training. In Europe, apprentices are young people between the ages of 14 and 18. The apprentices are expected to finish their on-the-job training and be a skilled workers at 18. The apprentices in Germany, for example, receives no wages but are paid an educational allowance that is intended only to aid their parents in supporting them. Further, the apprentices must, by law, attend a vocational training school for eight hours each week until they reach the age of 18. European countries are all similar with respect to both the age of apprentices and the lack of reliance on previous academic achievements as a requirement for apprenticeship (26:203).

Under Germany's 1969 Apprenticeship Act, the Federal Vocational Training Institute in Berlin develops the curriculum for each occupation in which there are apprenticeships, together with the affected union and employer associations (8:34).

As technology advances, apprenticeship in Germany has evolved away from "learning by doing" to a more theoretical

training. Large firms have apprenticeship training centers where apprentices spend much of their time with instructors, especially during the first 2 years. Smaller firms, which rely more heavily on apprentices for daily production, send their trainees for a few weeks at a time to area training centers, administered and partially financed by their local chamber of commerce and industry or chamber of artisans (8:34).

6.8 Financing

To support the costs of high-quality training, a firm or industry must, in effect, tax itself. In unionized companies, collective bargaining provides a mechanism for collecting such fees. In construction, apprenticeship is financed by contracts between unions and trade associations. Without union support, financing training is much more difficult: weak industry associations may be unable to obtain voluntary contributions from member firms, and a single firm acting alone may be unwilling or unable to support such extensive training (9:35).

In Louisiana, steel fabricators have developed a program to train workers at an academy financed by the major oil companies. Under the plan, the owners pay \$.10 into a training fund for every hour of craft labor worked on all fabrication contracts let in the area (22:15).

CHAPTER 7 CONCLUSIONS

The construction industry will have more problems meeting its workforce needs than most industries. In fact, the industry is already experiencing spot shortages of skilled workers. When these shortages occur, wages go up. Contractors will incorporate these additional costs in their bids, resulting in higher costs for construction users. These problems are primarily due to past practices and the parochial nature of the industry. The industry's problems need to be attacked on an industry basis. Because of the diverse nature of the industry, this is almost inconceivable.

The number of young people entering the workforce will decrease. This is not good news for construction, which requires more young workers than most industries. Because of the industry's reliance on a mobile workforce, the increase in the average age of workers will compound existing recruitment and retention problems.

Construction will need to fill the positions created by growth and the ones left vacant by workers leaving the industry. Workers leave the construction industry after ten or fifteen years. They leave the industry because of high unemployment, high accident rates, poor working conditions, and the requirement to move often. It will be easier to

recruit new workers and retain the workers that are leaving if the industry addresses these problems first.

Although the industry has a good image with young people, "construction workers" are not seen in the same light. Many of the perceptions about construction and its workers are correct. Industry associations need to mount a national campaign that highlights the positive aspects of construction and its workers, such as the feeling that craftworkers experience when they can show their friends and families the fruits of their labor. The Construction Industry Workforce Foundation is a phenomenal step in the right direction. But, only time will tell whether this vast array of associations can ignore their differences long enough to make some headway. Because young people and their parents consider training an asset, the industry must improve the training programs it has and create new ones.

Construction has an extremely poor record when it comes to recruiting and keeping female craftworkers. The trades are primarily white males. Women will make up 64% of all new entrants into the workforce. Construction work is still not a socially acceptable career path for women. This must change. Women have proven that they can do the work. Now, the industry must convince them to enter the trades by providing the proper incentives. Because many of them have or will have children, construction companies must follow the company in Alabama's lead by providing day-care.

The industry has been poor at recruiting and keeping minorities as well. However, some trades have been better than others. Because the percentage of minorities entering the workforce will be increasing, employers will need to actively pursue this source of labor. The number of immigrants that can be expected to enter the workforce is more a function of Congress than the will of the industry to recruit them.

Training is the answer to almost all problems associated with the industry; productivity can be improved, safety can be improved, even the image of construction workers can be improved. To accomplish these tasks, the training must be conducted and documented. The diverse nature of the industry has made it virtually impossible to obtain data on what and how much training contractors are conducting.

The apprenticeship system provides excellent training. However, most nonunion contractors are afraid to put the money into such programs because other contractors who do not use this form of training will steal these skilled artisans away.

The ABC's task training mode has a great deal of benefit. But they are having trouble getting their programs approved by the State Apprenticeship Councils. The proposed changes by the Bureau of Apprenticeship and Training may help alleviate this problem.

Vocational education programs are not used nearly as well as they could be. Communication between educators and

contractors must be improved. The programs need to be standardized so that workers can continue their training when they move to a different area. In Europe, non-college bound middle school graduates enter apprenticeship training. A similar system must be adopted in the United States. An Associated General Contractors chapter in Oregon has taken a step in the right direction by convincing a junior high in that state to adopt its Construction Skills curriculum.

Union apprenticeship programs are usually funded through collective bargaining agreements. Such agreements do not exist in the open shop sector, creating a funding problem. Some industrial users of construction have solved this problem by taxing themselves.

CHAPTER 8 RECOMMENDATIONS

The key to curing all of the other problems that the industry is experiencing is better, more organized training.

A national training program for construction workers should be created with Bureau of Apprenticeship and Training given the oversight authority. It needs to be national because workers move from state to state and contractor to contractor. The training needs to be standardized.

All the Construction Industry Workforce Foundation's goals should be adopted. Because the coalitions continued existence is tenuous, the Bureau of Apprenticeship and Training needs to take a more active role in the pursuit of these goals.

To show its commitment to improving productivity and training, the Federal Government should require that all agencies receiving Federal funds a percentage of construction costs to the state training agency in which the construction will be performed. To keep the training of skilled workers tied to the amount of construction activity in the area, the funding needs to stay in the immediate area.

Use existing vocational education facilities, in high schools and community colleges combined with on-the-job experience. The programs should allow contractors to pay the trainees, the Davis-Bacon apprentice wage rate. This should help convince contractors to assist with the on-the-job

portion of the training. As some industrial construction users have already figured out, users get a benefit from better training, such as higher productivity and more trained workers result in lower wages. Because of the lower wages, unions will more than likely fight the program. Training is their selling point.

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